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Northampton, the Swedish and Carlisle tables, and the supposed experience of the Equitable Assurance Office. The results of these comparisons are stated in a tabular form, and are very favourable to the law supposed.

In the second chapter, the author, after briefly explaining by algebraical reasoning, the mode of applying these principles to calculations of annuities, proposes general tables for facilitating this application in practice. These tables (which occupy 28 folio pages, and represent the logarithm of the present values of annuities for every value of a certain argument,) are actually calculated, and annexed to the communication, forming the principal part of the second chapter.

*Observations of the apparent distances and positions of 458 Double and Triple Stars, made in the years 1823, 1824, and 1825; together with a re-examination of 36 Stars of the same description, the distances and positions of which were communicated in a former Memoir. By James South, Esq. F.R.S. Read November 17, 1825. [Phil. Trans. 1826, Part I. p. 1.]*

The author prefaces these observations with a brief account of the instruments with which, and the circumstances under which, the observations previously communicated to this Society were made, and being fully described in the former paper alluded to in the title of this, require no further particular description; he contents himself therefore with noticing that by a different adaptation of their parts, higher magnifying powers than those formerly employed were obtained, and a series of powers from 92 to 787 used in a part of the observations.

A large portion of these observations were made at Passy near Paris, and the author takes occasion to make honourable mention of the facilities afforded him on the part of the French Government for the ingress and egress of his instruments into and out of France, and of the attention and assistance uniformly afforded him while resident there by many distinguished individuals.

Of the stars whose measures are here presented, he states that about 160 are hitherto undescribed and probably new. The places of these are given merely with sufficient exactness to enable any one to find them in future. The remainder are in great measure stars comprised in Mr. Struve's catalogue of 796 double and triple stars, and among them about 160 belong to those examined for the first time by Sir William Herschel.

The observations themselves are stated in a manner somewhat different from that adhered to in the former communication already alluded to. Instead of giving all the individual micrometrical measurements on which they depend (about 14,000 in number,) which would have swelled the paper to an enormous bulk, only the mean results of each set of measures are given: but to afford every opportunity of forming an impartial judgement of their validity, not only the number of measures on which it depends is annexed to each mean

result, but also the difference between the greatest and least means taken, or the limits within which all the measures necessarily lie.

The stars themselves are arranged in order of right ascension for convenience of reference. After the statement of the mean results of the several sets of observations both of angle and distance, a final mean with a mean date for an epoch is deduced. In the case of Sir William Herschel's stars, a comparison of the measures now obtained with those given in his catalogues, or now for the first time brought to light by a careful examination of his manuscripts, is subjoined. By this comparison several fresh instances have been found of double stars, in which the relative motion of the individuals composing them is satisfactorily proved. In one remarkable case (that of the star  $\delta$  Equulei,) this change has gone to an enormous extent, and is satisfactorily referred to proper motion in the large star. In another not less singular, all the three stars of a triple star ( $\zeta$  Cancr) are ascertained to be relatively in motion, describing orbits about each other, and forming probably a ternary system by the mutual gravitation of its members, thus completely justifying the views taken by Sir William Herschel of this subject, in his papers published in the Transactions of this Society in 1802 and 1804.

Annexed, as an appendix to these observations, is a re-examination of about 27 stars measured in the former paper already alluded to, and which were considered as presenting peculiar interest, from the evidence then obtained of their relative motion and of their connexion in binary systems. The results of this re-examination are in the highest degree satisfactory, as, with only two or three exceptions, these stars have been found to continue their motions in the directions, and in the greater number of cases with nearly the velocities, predicted. In the most remarkable case, that of the double star  $\xi$  Ursæ Majoris, an angle of nearly  $14^\circ$  has thus been described by the two stars about their common centre of gravity in an interval of less than two years, thus affording every probability that in a very few years we shall arrive at a perfect knowledge of the figure, elements, and position of their orbits, and be enabled by strict calculation to answer the important question, whether the Newtonian law of attraction is confined to our own system or obtains also in the sidereal heavens.

*An Account of the Construction and Adjustment of the New Standards of Weights and Measures of the United Kingdom of Great Britain and Ireland.* By Captain Henry Kater, F.R.S. Read November 24, 1825. [*Phil. Trans.* 1826, Part II. p. 1.]

The author, after stating that the weights and measures of the United Kingdom are founded on a standard whose length is determined by its proportion to that of a pendulum vibrating mean time in London, which has been ascertained by him to be 39.13929 inches of Sir George Shuckburgh's scale, considers it necessary, on account of the importance of the result, to consider what degree of confidence